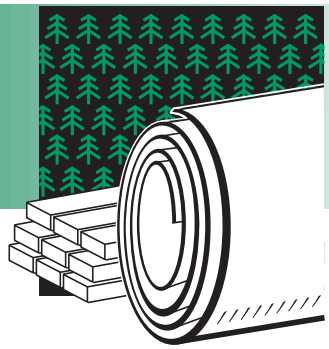
FOREST PRODUCTS

Project Fact Sheet



BLEACH PLANT CAPITAL REDUCTION WITH RAPID D_o BLEACHING AND SIMPLIFIED [D/E/D] STAGES

BENEFITS

Significant savings on capital equipment for industry

- Compliance with environmental regulations by displacing the use of chlorine and hypochlorite in processing steps
- Availability of research funds, technical assistance, materials, and advice, and a means for technology transfer, from the member companies of IPST

APPLICATIONS

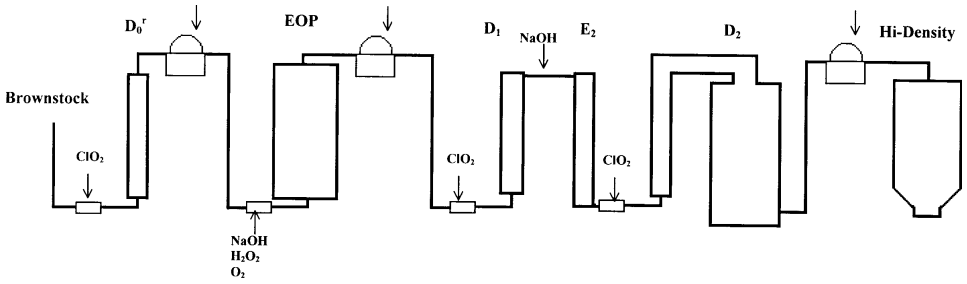
The results of this project will be transferred to both members and nonmembers of IPST through presentations at conferences and trial implementations, as well as through published journal articles.

SIMPLIFIED BLEACHING PROCESS WILL MEET ENVIRONMENTAL REQUIREMENTS

The pulp and paper industry has found a promising bleaching process that achieves high brightness and low chlorine emissions without installing expensive capital equipment. The industry must adopt a bleaching process that is free of elemental chlorine in order to comply with the Environmental Protection Agency's "Cluster Rule." Planning is underway to reconfigure bleach plants to reduce the discharge of chlorinated organic compounds yet allow the industry to continue to produce high-quality products. However, the high cost of certain capital equipment such as towers and washers is forcing the industry to look for proven methods of achieving these goals with existing equipment or with easily adapted new technologies.

Investigators will demonstrate a process in which there is a one-minute retention time in the initial chlorine dioxide stage that achieves the majority of the delignification of a thirty-minute stage but with fewer emissions. This is followed by a stage that completes the bleaching sequence with little capital investment and no additional washing sequences.

BLEACH PLANT SCHEMATIC



Bleach plant schematic showing the D^r(EOP)(D/E/D) sequence. The combination of "Rapid D_0 and simplified bleaching (D/E/D) can convert a three-stage bleach plant to five stages with low capital investment.

Project Description

Goal: To demonstrate the capability of a two-step sequence to bleach hardwood and softwood kraft pulps to high brightness, acceptable pulp strength, and low emissions of chlorinated organic compounds, and to identify optimal operating conditions for the process.

Kinetic studies of the various bleaching studies have shown that a very fast delignification reaction and the majority of the bleaching occur in the initial chlorine dioxide stage (D_o). A one-minute retention time, with a 0.25 kappa factor, achieved 84 percent delignification of a 30-minute stage, and generated only 42 percent of the chlorine emissions (as measured by adsorbable organic halide, AOX) in the D_o and E stages. This reaction can be controlled somewhat by varying the temperature and pH of the medium. Also, the kappa factor can be reduced from 0.25 to 0.1, and the AOX reduced 30 percent with no reduction in brightness if peroxide is added to the extraction stage. The remainder of the bleaching sequence takes place at a slower reaction, and a "Simplified Bleaching" technology (termed D/E/D) has been developed for this stage that has little capital investment and requires no additional washing stages. The pulp product was shown to be fully bleached and of superior strength compared to pulp produced by conventional methods.

Testing of new low-cost technology will also be conducted for modifying certain mills that could not meet the pulp quality desired with their present equipment without using more chlorine dioxide. By adding an efficient mixer and U-tube, the appropriate bleaching sequences and operating conditions would be available without much capital investment.

Progress & Milestones

- Phase 1 of the work will be optimization of the D_o stage for both retention time and kappa factor.
- The second phase is further bleaching with the D/E/D scheme.
- Phase 3 is use of optimized conditions to prepare large batches of pulp for yield and strength determination. Experiments will be carried out under varying conditions at each phase, and the information used to determine how to proceed in the next phase.
- Member companies of the Institute of Paper Science and Technology who have joined the institute's Chemical Pulping and Bleaching Project Advisory Committee will be invited to participate in mill trials.
- The final milestone for this one-year effort is a final report on the activities undertaken.

Project Partners

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